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FLOOD INSURANCE STUDY

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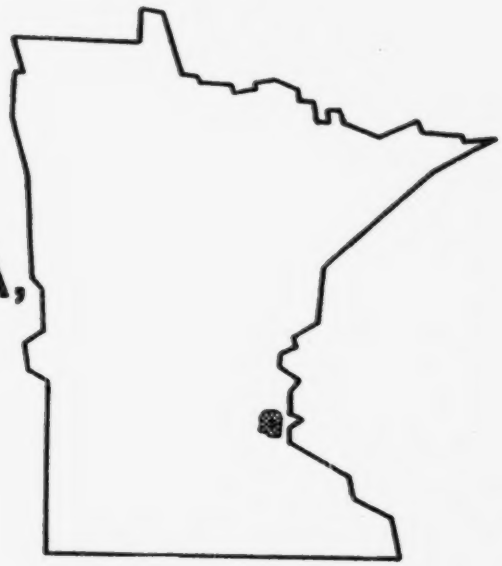

CITY OF LITTLE CANADA, MINNESOTA
RAMSEY COUNTY

MAY 3, 1982

Federal Emergency Management Agency

COMMUNITY NUMBER - 270377

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Flood Insurance Rate Map

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FLOOD INSURANCE STUDY

CITY OF LITTLE CANADA

RAMSEY COUNTY, MINNESOTA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Little Canada, Ramsey County, Minnesota, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Little Canada to the regular program of flood insurance by the Federal Emergency Management Agency (FEMA). Local and regional planners will also use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.1(c). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Edwards and Kelcey, Inc. for the Federal Emergency Management Agency under Contract EMW-C-0322. This study was completed in June, 1981.

1.3 Coordination

Lakes requiring detailed study were identified at a meeting attended by representatives of the Study Contractor, FEMA, and representatives of the City of Little Canada at the initial time, cost and coordination meeting held in June, 1979.

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Hydrologic analyses were coordinated with members of Hydrology Interagency Review Committee, the Minnesota Department of Natural Resources (MnDNR), the U.S. Army Corps of Engineers (COE), the U.S. Geological Survey (USGS), the Soil Conservation Service (SCS), and the Minnesota Department of Transportation (Mn/DOT).

On December 7, 1981, the results of the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Little Canada. The area of study is shown on the vicinity map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through June, 1986.

Twin Lake, Round Lake, Savage Lake and Gervais Lake within the corporate limits of Little Canada, were studied by detailed methods.

Several areas within the corporate limits of Little Canada were studied by approximate methods. These areas were located from the Flood Hazard Boundary Map, and field checked to determine the extent of flooding.

2.2 Community Description

The City of Little Canada is located in the northeast suburban area of the Minneapolis - St. Paul Metropolitan Region in central Ramsey County. The cities adjacent to Little Canada include Vadnais Heights to the north, Roseville and Shoreview to the west, Maplewood to the east and to the south. Its population is 7,102 according to the 1980 Census estimates (Reference 1). The area of Little Canada is approximately 4.0 square miles.

The climate of the area is characterized by large seasonal variations in temperature, normally sufficient rainfall for crops, and moderate snowfall. The summers are warm and moderately humid, the winters are cold and moderately humid.

The mean annual temperature is 44.1 degrees Fahrenheit (F)

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FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LITTLE CANADA, MN.
(RAMSEY COUNTY)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

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with the variation in mean monthly temperatures varying between 12.2 degrees F in January to 71.9 degrees F in July. Annual precipitation averages 25.9 inches, and ranges from 4.0 inches in June to 0.7 inches in January. Snowfall averages about 44 inches annually and represents approximately 17 percent of the total precipitation.

The topography of Little Canada can be described as generally flat to moderately rolling. The eastern half of Little Canada is considerably flatter than most of Ramsey County. The City of Little Canada is rapidly becoming completely urbanized. The major land uses within the city are highways, commercial and industrial properties and residential property. The only open space is adjacent to Twin Lake.

2.3 Principal Flood Problems

Low-lying areas adjacent to Gervais Lake are subject to periodic high water levels. The most severe high water levels occur as a result of spring snowmelt coupled with heavy rains. Damages resulted primarily in backyard erosion and water filled basements. Data for record water levels as listed below were recorded by the Ramsey County Engineers.

DATE	ELEVATION (FEET)	ESTIMATED FREQUENCY (YEARS)
1978	862.37	300
1942	861.70	55
1975	861.07	17
1952	860.85	13

2.4 Flood Protection Measures

No flood control structures have been built in the study area, and no complete flood plain management program is in effect.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1 and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods

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greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten), and for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

The hydrologic analysis of Gervais Lake was performed by graphically plotting 53 years of historic lake levels vs. probability of occurence on arithmetic-probability paper. The resulting stage-frequency curve was derived with additional information on the individual storms that produced the peak elevations.

The peak flood elevations for Twin Lake, Round Lake and Savage Lake were obtained by the use of the SCS TR-20 computer program (Reference 2). Storms of 6-hour, 12-hour and 24-hour duration were analyzed. Rainfall depths for the storms were taken from the National Weather Service Technical Paper No. 40 (Reference 3). The starting lake elevations were chosen at the inverts of the outlet structures. T_c was determined by methods outlined in the Hydrology Guide for Minnesota (Reference 4). The storage-elevation curves were determined from the USGS 7.5-minute quadrangle map of the area (Reference 5).

Peak elevations for the 10-, 50-, 100-, and 500-year floods on Gervais Lake, Round Lake, Savage Lake, and Twin Lake are shown in Table 1.

TABLE 1 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQUARE MILES)	PEAK ELEVATIONS (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
Gervais Lake	55.0	860.8	861.8	862.3	863.2
Round Lake	0.3	903.8	904.6	905.1	906.0
Savage Lake	0.4	896.1	896.9	897.3	898.2
Twin Lake	0.3	870.6	871.2	871.5	872.0

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks located within Little Canada are shown on the FIRM.

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4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by FEMA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each lake studied in detail, the boundaries of the 100-, and the 500-year floods have been delineated using the flood elevations determined for each lake. The flood boundaries were interpolated using topographic maps photo-enlarged to a scale of 1:6000 with a contour interval of 10 feet (Reference 5).

In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown. These boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year flood boundary corresponds to the boundary of the areas of special flood hazards; and the 500-year flood boundary corresponds to the boundary of areas of moderate flood hazards.

Small areas within the flood boundaries may lie above the flood elevations, and therefore may not be subject to flooding. Due to limitations of the map scale and/or lack of detailed topographic data, such areas are not shown.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, FEMA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factor (FHF) and flood insurance zone designations for each flooding source affecting Little Canada.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses or waterbodies having relatively the same flood hazard. In lacustrine areas, reaches are limited to the distance for which the 100-year flood elevation does not vary more than 1.0 foot. Using these criteria, 4 reaches were required for the flooding source of Little Canada. The location of these reaches are shown on the Flood Insurance Rate Map.

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5.2 Flood Hazard Factors (FHF)

The Flood Hazard Factor is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year flood water-surface elevations is greater than 10.0 feet, the accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHF's, the entire City of Little Canada was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods, no base flood elevations shown or FHFs determined.
Zone A2-A3:	Special Flood Hazard Areas inundated by detailed methods; base flood elevations shown, and zones assigned according to FHFs.
Zone B:	Areas between the Special Flood Hazard Areas and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; or, areas subject to 100-year flooding from sources with drainage areas of less than one square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 2, "Flood Insurance Zone Data:, summarizes the flood elevation differences, FHFs flood insurance zones, and base flood elevations for each flooding source studied in detail in the community.

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FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION (FEET NGVD)[3]
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
GERVAIS LAKE							
Reach 1	0001,0002	-1.5	-0.5	0.9	015	A3	862
ROUND LAKE							
Reach 1	0001	-1.3	-0.5	0.9	015	A3	905
TWIN LAKE							
Reach 1	0002	-0.9	-0.3	0.5	010	A2	872
SAVAGE LAKE							
Reach 1	0001	-1.2	-0.4	0.9	010	A2	897

[1] FLOOD INSURANCE RATE MAP PANEL [2] WEIGHTED AVERAGE [3] ROUNDED TO NEAREST FOOT

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF LITTLE CANADA, MN.
RAMSEY COUNTY

FLOOD INSURANCE ZONE DATA

GERVAIS LAKE - ROUND LAKE
SAVAGE LAKE - TWIN LAKE

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5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map (FIRM) for the City of Little Canada is, for insurance purposes, the principal result of the Flood Insurance Study. This map contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by FEMA.

6.0 OTHER STUDIES

The Hydrologic Analysis of Lakes and Open Space in Ramsey County, prepared by Barr Engineering Co. (Reference 6), includes the 100-year elevations for several lakes included in this Flood Insurance Study. These 100-year elevations are based on the ultimate land development in Little Canada; they are not compatible with the elevations determined by this study, as these elevations are based on present hydrologic conditions in the watershed.

A Flood Hazard Boundary Map (FHBM) for Little Canada has been published by the Federal Insurance Administration (Reference 7). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Natural and Technological Hazards Division of the Federal Emergency Management Agency, 300 South Wacker Drive, 24th Floor, Chicago, Illinois 60606.

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8.0 REFERENCES AND BIBLIOGRAPHY

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7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Little Canada, Minnesota, July 1976.

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